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Some Recent Botanical Literature.—In the August and September numbers of the *Journal of Botany* George Murray continues his useful catalogue of the Marine Algæ of the West Indian Region. —Mr. Buchanan White, in the September number, publishes a list of British willows, amounting to seventeen different speces, with many varieties and hybrids.—Britten and Boulger's Biographical Index of British and Irish Botantists has reached Lindsay. It is a most condensed index, and one wishes it could have been a little less so, especially in case of such men as Knight, Leighton, Lindley, etc.—A short obituary of the Rev. M. J. Berkeley appears in the September *Grevillea.* Born in 1803, he lived until the 30th of July of this year, reaching the ripe age of nearly eighty-six years. For more than half a century he was a careful student of the fungi. His herbarium, containing the types of about five thousand species, was deposited in the Kew Herbarium in 1879.—M. C. Cooke's new edition of his Handbook of the British Fungi has reached the genus Russula. The last species described is numbered 1214. Professor Underwood and O. F. Cook have compiled a generic synopsis of the Basidiomycetes and Myxomycetes covering twenty-one pamphlet pages. It is designed to accompany A Century of Illustrative Fungi, distributed by the authors.

BACTERIOLOGY.

Phenyl Alcohol as a Preservative for Growths of Bacteria on nutrient Agar agar.—While working on bacteria at the Illinois Laboratory of Natural History recently, the writer of this note made a few experiments with a view to finding something that could be used to preserve growths of bacteria in and on nutrient agar agar. Among a number of preservatives employed a thirty per cent. solution of carbolic acid in alcohol was finally settled on, as giving the most satisfactory results. The acid counteracts the whitening tendency of the alcohol to such an extent that the preserved agar agar is more transparent than the original. For very profuse surface growths it does not answer well, because the alcohol hardens, and renders them brittle, so that they are liable subsequently to flake off from the gelatine. Growths which have not been allowed to stand too long, however, before fixing, retain in the preservative much of their original appearance. The alcohol used was the ordinary commercial article (in the neighborhood of 95 per cent.), and it may prove that a weaker grade, as likely to alter the gelatine less, will answer the purpose better.—H. GARMAN.

The Effects of CO_2 Upon Bacteria.—An important paper has recently appeared, by Dr. Carl Fränkel, on the influence of carbonic acid gas upon the life and activities of micro-organisms.[1] Fränkel was led to undertake this investigation by noticing that the deeper layers of soil, when freshly examined, contained very few germs, but after standing a few hours became prodigiously rich in bacteria. Thus, for instance, a sample of earth taken from the depth of three-and-a-half meters was found to hold in one-fiftieth of a cubic centimeter twelve living germs, but in twenty-four hours this number had mounted to 40,888. The question therefore arises as to why the micro-organisms existing in the lower strata of the soil do not thrive and multiply, since they are evidently in the presence of abundant and satisfactory food. Plainly there must be some influence in the sub-soil distinctly hostile to the development of the bacteria which are there present. Fränkel suspected that the unfavorable conditions might lie in the peculiar composition of the ground air, since this differs from ordinary atmospheric air in the smaller amount of oxygen and the much larger amount of carbonic acid which it contains. He has consequently studied the effects of carbonic acid upon micro-organisms with a view to clearing up this matter, and to throwing some light on the problems of putrefaction.

After giving the details of a series of skilfully conceived and carefully executed experiments, Fränkel briefly sums up his results.

1. A certain number of the known species of bacteria are able to thrive practically as well in CO_2 as in ordinary air.

2. Others, although able to develop in CO_2, have their growth delayed and hindered by its presence.

3. A third group does not grow in CO_2 under ordinary conditions, but develops when placed at the incubating temperature [35°-37°].

4. The greater part of the rest, including many saprophytic kinds, do not thrive in CO_2 under any conditions whatever, but are not, however, killed, and always develop when the CO_2 is replaced by atmospheric air, even after being subjected to the action of the CO_2 for a long time.

5. Some bacteria, among them the most important pathogenic kinds

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[1] Die Einwirkung der Kohlensäure and die Lebensthätigkeit der Mikroorganismen. *Zeitschrift für Hygiene*, V. Bd., II. Heft, S. 332, 21 Nov., 1888.

(Cholera and Anthrax), are destroyed by the CO_2 more or less completely.

In spite of this influence of CO_2 in checking development, and in some cases in partially destroying the germs, it is not available as a means for preventing putrefaction, and is therefore not an antiseptic in the narrower sense of that term. A relatively insignificant admixture of ordinary air allows a rich development of even the kinds of bacteria most sensitive towards CO_2.

CO_2, then, for some micro-organisms is not an indifferent gas, but exerts a strongly inhibitory influence upon their multiplication, and in some cases destroys part of the germs submitted to its action. That this injurious effect is not due to the absence of oxygen is shown by the fact that a number of this group are anærobic in habit. For other kinds of bacteria CO_2 is apparently wholly inert.—E. O. JORDAN.

The New Science of Hygiene.—Whatever his opinions of the modern times may be in other respects every one must admit that the present contrasts most sharply with the past in its keen sensitiveness to the public welfare. Especially is this true of great cities, which have gone so far in this direction that it seems to be their highest endeavor to overcome the obstructions to the public health incurred by unnatural conditions such as density of population, and to work out for themselves new and better conditions of existence. A new root has sprung from the tree of knowledge, and hygienic science is shedding its light even in the darkest places, and civilized nations are hastening to meet this new necessity by the establishment of hygienic laboratories, yet at the same time it is but a one-sided view which regards hygiene as the handmaid of medicine only; on the contrary, it touches practical life in manifold ways of the utmost importance.—*Zeitschrift für Hygiene.*